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Commissioner of Japan Patent Office:
1. Title of the Invention: Patent Application
2. Inventor: February 6, 1975
 Domicile: Hideo SAITO
3. Applicant: Air sterilization and purification apparatus
 Domicile: Kiyoshi ANZAI
4. Agent: 1070-2 Kataoka, Hiratsuka-shi, Kanagawa-ken
 Domicile: Director: Kiyoshi ANZAI
5. List of Appended Documents Kyowa Seiko, Ltd.
 (1) Specification 1070-2 Kataoka, Hiratsuka-shi, Kanagawa-ken
 (2) Drawings 1 set
 (3) Duplicate Copy of Application 1 set
 (4) Power of Attorney 1 set Method Examination
 (5) Request for Examination 1 set

Specification.

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1. Name of the Invention: Air Sterilization and Purification Apparatus

2. Scope of Patent Claims

In an air purification apparatus that passes positively charged airborne dust between opposing electrodes, an air sterilization and purification apparatus wherein air is caused to pass through while inducing a separation phenomenon by switching the direction of flow of air that passes through the aforementioned opposing electrodes and modifying a cross section of the passage.

3. Detailed Description of the Invention

The invention of the present application is one that relates to an air sterilization and purification apparatus, and in a purification device that causes airborne dust particles to be absorbed by static electricity, relates to a device capable of raising dust removal effectiveness, and is intended to achieve an air sterilization and purification apparatus that, in particular, is made up of a combination of novel and ever simpler elements, is manufactured by a simple process with lower costs of production, and that, with excellent safety, is capable of achieving even better results in use.

Along with the development of heavy industry, air pollution from sources at each stage of the production process, nitrous oxide and sulfur dioxide emitted from transportation sources, and heavy metal particulates, have steadily increased. The widespread expansion of pollution has become an issue of serious concern to society, and various regulations have been proposed to prevent pollution, including preventing the generation of toxic materials as well as the strengthening of emissions standards. These approaches, however, cannot be considered adequate, and there are a growing number of people who suffer from lung cancer and other cancers as well as an increase in the number of people suffering from asthma. Air purifiers have become a common and indispensable part of life and are to be found installed in homes and sickrooms to prevent and/or treat these illnesses, and are used as prevention or treatment devices in the production stages of sanitary pharmaceuticals, foods, devices, and are also employed in the production of precision machinery.

A variety of devices have been suggested to cleanse the air by removing airborne toxic materials. Among those are air purifiers that use filter materials in air flow passageways to physically collect the dust, or electrical air purification devices such as dust removers that make use of static electricity or infrared rays to disinfect the air, or a combination of any of these approaches in order to remove toxic materials.

Among these, suggestions for conventional devices based on the aforementioned use of static electricity are known, including, for example, (a) an approach utilizing centrifugal force designed such that air, induced from an air inlet, passes through an ionization element while electrical voltage is applied to the inner and outer cylinders while the inner cylinder rotates, moving the air between the inner and outer cylinders, and (b) an approach where, in the above configuration, the outer circumference of an inner cylinder has inclined guide vanes provided in the axial direction along the outer circumference of the inner cylinder and rotational movement is applied to the air as it passes through between the inner and outer cylinders to make use of centrifugal force.

The above mentioned approaches have attempted combined dust collection by the use of electrostatic migration and centrifugal force, however, because high voltages with 11 KV in between the inner and outer cylinders, and as a result of rotating the induced air, a rectified electricity may be generated due to frictional resistance depending upon the air flow rate, and electric discharge sparks may occur between the dust particles that have collected onto the external cylinder, frequently causing risk of electrocution as well as the increased production of ozone and possible malfunction of the device.

In view of the above, research conducted by the inventors of the present application have overcome and eliminated the well known defects described above, and have perfected a device that is superior in terms of safety and that markedly increases the efficiency with which dust is adsorbed. The invention comprises a fan motor; an inner cylindrical electrode that has a

built-in high-voltage transformer, and that is connected to the positive side; a high voltage cap connected to the negative side; an external cylindrical electrode that is earthed; and a housing that has openings on both sides, and that is supported by a pedestal. On occasion that airborne dust that is guided into the unit through the upper inlet passes through an ionization section high-voltage cap that is connected on the negative side, a positive charge is applied to the dust, and it is guided into the electrostatic field between the grounded outer cylindrical electrode and the positive inner cylindrical electrode, and as a result of the electrostatic induction effect, airborne dust passing through is adsorbed onto the surface of the outer cylindrical electrode. Thus, the present invention is characterized by having opposing electrodes that have a plurality of parallel curved surfaces and a plurality of convex curved surfaces or recessed curved surfaces on the inner cylinder and an outer cylinder provided with a plurality of parallel curved surfaces and a plurality of convex curved surfaces or recessed surfaces, wherein the convex curved surfaces or recessed surfaces of the inner cylinder and the convex surfaces or recessed surfaces of the outer cylinder alternate with each other. By creating an electrostatic field between these opposing cylinders, the direction of the flow of air passing through them can be alternated, and the flow passageway cross section can be altered so that the flow rate fluctuates, thereby creating a flow separation phenomenon. This causes the generation of a stagnant flow, a reverse flow, or a turbulent flow of air that contains dust. The intention here is to extend the duration of the effect of the electrostatic adsorption on the outer cylindrical electrode surface and to increase in the efficiency of dust removal. The next object of this invention is to provide a device with superior safety. Additionally, an object of the invention is to provide a simple and compact mechanism that can be made available at low cost and that can be placed easily in a variety of locations, as well as to provide a device that allows simple, easy, and safe cleaning of the panel upon which the dust has been adsorbed. Other objects and characteristics of the present invention can be understood from the following explanation.

In Figs. 1 through 5, a housing acceptor cylinder (5) is supported on a stand (1) by means of a shaft (2) upon which a support board (4) consisting of insulating material and provided with exhaust windows (3); an external cylinder accepting cylinder (7) is mounted on the edge of the lower opening section of said housing; an exhaust windows (6) is arranged in the external cylinder barrel (7); and a fan motor (8) is internally installed in a motor cap (9). The fan motor (8) (for practical purposes, preferably with a maximum torque of $1040 \pm 10\%$) is connected to a power source, and the motor cap (9) has a built-in high-voltage transformer (11) that is connected to a power source. An inner tube electrode (14) made of metal and provided with stepwise alternating vertical curved surfaces (12) and convex curved surfaces (13) is installed onto the positive side of the high-voltage transformer, and a rounded-head inner cap (16) made of insulating material and continuing the multiple outer cylinder support [illegible] (15), (15) is mounted in the top opening of this inner cylindrical electrode (14). A metallic high voltage cap (18) that is provided with a limit switch (17) is installed in this cap (16) and connected to the negative side of the high-voltage transformer and a metallic outer cylindrical electrode (22) provided with stepwise alternating vertical curved surfaces (20) and recessed curved surfaces (21) on the upper opening edge step section (19) of the outer cylinder acceptor (7). The vertical arced surfaces (20) and the recessed arced surfaces (21) are positioned so as to face the swelling arced surfaces (12) on the inner cylindrical electrode (14) and the vertical arced surfaces (12) on the inner cylindrical electrode (14) with each other, respectively. The external cylindrical electrode (22) faces the inner cylindrical electrode (14). According to FIG. 1, an air inlet window (23) is arranged in the upper opening of the external cylindrical electrode (22), and a retainer plate (25) made of insulating material is provided on the bottom limit switch retainer element (24). Next,

the housing (27) is installed on the upper opening of the outer perimeter section (26) of the housing acceptor cylinder (5), which is installed on the support board (4). A head section retaining cylinder (28) is installed at the top section of this opening, and an air inlet window (29) is provided in this upper opening and a connector board (31) made of insulating material and provided with dust-proof mesh/screen (30) that is connected by means of bolts (32) to the retainer plate (25), air inlet windows (29), and air inlet windows (23), and is configured so that air passes between the inner and outer electrodes, the exhaust windows (6), and the exhaust windows (3), and is circulated to the outside when the fan motor (8) is operating.

At this time, when the high voltage transformer (11) and power source are connected by a switch, which is separately arranged (in practical terms, an input voltage of 100 V AC and output voltage of 7 KV DC are preferable) the airborne dust that is introduced [into the unit] is positively charged in the vicinity of the transformer (11), by the inner cylindrical electrode (14) that has been connected to the positive side by means of the electrostatic induction between the inner and outer electrodes, and is migrated to the external cylindrical electrodes (22) and clung to its walls.

Here, the direction of the air flow that is passing through the convex curved surfaces (12) and vertical curved surfaces (13) provided on the inner cylindrical electrode (14) is switched by the vertical curved surfaces (20) and recessed curved surfaces (21) provided on the outer cylindrical electrodes (22), and as a result of the change in the cross section layer between these electrodes, the spacing between the vertical curved surfaces (12), (20) of both electrodes should be approximately 20 mm; the spacing between the vertical curved surfaces (21) on the outer cylindrical electrodes (22) and the convex surfaces (13) on the inner cylindrical electrodes (14) should be approximately 16 mm; and the spacing between the recessed curved surfaces (21) on the outer cylindrical electrodes (22) and the vertical curved surfaces (12) on the inner cylindrical electrode (14) should be approximately 25 mm, for practical purposes. The recessed curved surfaces (21) should be 5 mm in diameter, while the convex curved surfaces (13) should be 4 mm in diameter. There is a change in flow rate, and the separation phenomenon is augmented. As a result, the dust-bearing air flow stagnates, reverses or becomes turbulent, thereby extending the duration for electrostatic adsorption and increasing dust collection efficiency (Fig. 6).

In the cross sectional configuration of the above mentioned both electrodes described above, in another embodiment, the convex curved surfaces (13) of the inner cylindrical electrodes (14) could have a gentle linear flow [illegible] convex curved surfaces (13) on the upstream side to intensify the switching of the direction of flow and the change in the flow passageway cross section, making it that much easier for the separation phenomenon to occur, forming lead (33) between the convex curved surfaces (13), (13) for a configuration that augments electrostatic induction. (Fig. 7)

Moreover, as a separate embodiment, convex curved surfaces (34) with gentle flow lines are formed on the upstream side of the outer cylindrical electrodes (22), and both flow line convex curved surfaces (34) and flow line convex curved surfaces (35) are positioned so they oppose one another, thereby intensifying the switching of the direction of flow and the change in the flow passageway cross section, extending the duration in which adsorption occurs due to stagnation, reverse flow, and turbulent flow of the dust-containing air (Fig. 8).

With regard to removal of dust clung onto the surfaces of the outer cylindrical electrodes, the power to electrode (22) is removed along with the retainer plate (25) by removing the connector board (31) and by pulling up and removing the head section retaining cylinder (28) and the housing (27), and after cleaning these, it is easy to restore them to their original state and join together. At this time, the retainer element (24) of the retainer plate (25) is separated from the limit switch

(17), thereby breaking off the flow of current between the high-voltage transformer (11) and the power source, so that there is no risk of electrocution.

As configured above, the present invention extends the duration of the cling effect on the outer cylindrical electrode by means of electrostatic induction of the dust-carrying air that passes between the electrodes, thereby increasing the efficiency of dust removal and reducing mold spores and yeast fungus.

Moreover, this is a particularly safe device since there is no danger that frictional force and resulting rectified electricity will be generated as a result of centrifugal force as the air passes through the unit, and the risk of malfunction due to sparking electric discharge between the adsorbed dust particles resulting in electrocution or explosion can be prevented, and the generation of ozone can be suppressed.

Also, given the device's simple and compact configuration, it can be manufactured less expensively, and it is also easy to move.

4. Brief Description of the Drawings

Figure 1 is a front view. Figure 2 is a plan view. Figure 3 is a view of the bottom surface. Figure 4 is a cross-sectional view along the A-A line in Figure 1. Figure 5 is a cross-sectional view along the B-B line in Figure 1. Figure 6 is an enlarged view of the area indicated by the letter E in Figure 4. Figure 7 is an enlarged flow line cross section diagram of another embodiment. Figure 8 is an enlarged flow line cross section diagram of yet another embodiment.

Applicant: Kyowa Seiko, Ltd.

Agent: Hiraki MIURA [seal]

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卷一百一十五

1.	姓 名	明 朝 萍	性 別	男
2.	年 齡	西 曆 歲 數	年 齡	20
3.	國 籍	中 華 民 國	人 種	漢
4.	職 業	學 生	身 份	大學生
5.	代 理 人	王 立 平	地 址	北 京 市 崇 文 區 朝 陽 里 2 號
6.	相 片	明 朝 萍	指 紋	右 手 食 指
(1)	明 朝 萍	1	通 照 函 件	2328
(2)	明 朝 萍	2		
(3)	明 朝 萍	3		
(4)	明 朝 萍	4		
(5)	明 朝 萍	5		

50 *oicosa*

四、外國口名稱 立派歐洲製造品
五、發送日本之原因

五の事件をねえられたおじいさんのこと。おじいさんはお酒を過剰に飲んでいたので、おじいさんは死んでしまって、おじいさんのお葬式が行われました。おじいさんはお酒を過剰に飲んでいたので、おじいさんは死んでしまって、おじいさんのお葬式が行われました。

卷之三

太陽の表面は、空気被覆層の蒸氣に由り、太陽
中のふんじんを導電率により電流せしめる電気伝
導によって、その熱電導率を上げるととのである
極端に由り、もぐれ電流で一周導電率を発生する部分
がある。周半で正四角とより直角の電流方向で生
成され、太陽表面に現れ、エリミン使用が風を
消さざりととのである極端な場合は熱源だとすると
4000ある。

卷之三

⑩ 日本国特許庁
公開特許公報

①特開昭 51-90077
④公開日 昭51(1976)8.6
②特許署 F.O. 16030
③出願日 昭50(1975).2.6
審査請求 有 (全5頁)
厅内整理番号 3446

◎日本分類

• ⑧ Int Clz
BOSC v/αj

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がでされてゐる。

支那、南洋諸島は勿論に於て西端の結果は、何
より、即ち、立派な入口から中入する大空港建築物
を造つて、何處の工場更に販賣場所が充てられ
得る。勿論、ヨセカナルを造らざる事はあらず、
かくして地心力が作用する結果、即ち、上層の機械
をもって、勿論、機械をもつて輸送する方法に付し得
した運行法を確立、又東洋のCONTRAPUNICON
等を用ひた場合に既述の如きと全く違ひ、機械
の運行能力を制限する原因が無くなる。

次に御用事につき又お尋ねの御成を申し上候
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又承用事に、ベラクシタおゆめを承りし、既ヘツ

卷之三

上田の丸子、この御用事は伊豆の御用事と申す
事の御用事より大内を見廻されし。でて此の御用
事は、ふんじんの奥の御石を一組持ることと
てセミナリヤを付せしもの。アラヤート、
モロトランスセヒキルイシムシテモハシク
・ヨウキムラタケマツヤツ、モハシク
セモエビシムシテモハシクルハ
ラシングから蜀成され。上野入出と申入され
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(2)は内口と外山の通航区間(23)と互いに内河
干石よりなるがゆえにして、内河通航(24)と外河通
航して運送し大上、その上方内河間に運送支線(25)を
有し、下流カリミットスイッチの開閉操作(26)を行
かずする時は各支線からなる運送支線(23)を遮断し、
常に内河支線用の水門を关闭したヘッドラング内河間に
上方内河用開閉操作(24)によってラング(26)を操作
し、その上方内河間に長距離航行支線(23)を遮断し大
上、その上方内河間に航行船(27)を運送する時は
開閉操作(26)を行はずして内河支線からなる運送支線(23)
を遮断し、ボート(28)を介して内河航行(25)を進
みし、内河航行を止めしめ、ファンクニート(29)を行
なう事、大河航行(30)と内河航行(25)との取
扱取(31)から内河航行(25)となり、内河航行開閉操作
遮断し、内河航行(25)、内河航行で内河航行手すり開
設とする。

その日、午後二時半（13時）に開港式には、スガ
蟹田丸、00、1907、地力丸、00、1907
、新潟丸が並んで、日本丸と並んで航行した。スガ
蟹田丸は、日本丸より少し前に進んだ。
スガ蟹田丸は、日本丸より少し前に進んだ。

上記の如きの所見解説について、前回御解釋をして、何回か御質問を頂いて、何回か御質問 (34) の御内閣官房担当の上井司を除く本件の御質問 (35) としまして是れ五点の御質問を之が御質問 (35) の御質問を除し、本件質問を一月以内に答えることを内閣に命じた。是れ當初質問 (35) (36) に対するとどまらずに、是れ当初質問 (35) (36) に答へねばと理解して日本政府を詰めとする結果となつたと見て可い。(以上二回)

また、外洋を横断する汽船はまだ珍しいものであつては、汽船運河の開通を待つまゝに現し、駆逐艦と並んで、その上に立つて飛行場として利用する。これは、外洋を横断する汽船が現れたときから現れてゐる。

第三回 907 (3)
は、西田ヤンコの口で語られてゐるが、
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國であると云ふ點を最も多く取扱ふ
ものであつて、その結果として、日本は
世界に最も多くの貢献をなす國である。
この事、西田ヤンコによれば、

おでて御用意である。この結果は(2)の研究
結果(3)をもつて、必ずしも正確である。左記
トランザクションを実現するため、まず
マーケット上に

又、通風中の空氣は、熱心なまゝにえつて地井戸
穴にとる發電電気の熱をうつされぬなく、よつて
これが元上りんとの間に火花火災に利用する
事無くて放火犯の隠匿を麻痺に叫んでゐること
である。又ナゾの発生を説明するとともてある
その仕に莫大な影響である。

さらに農業は商業小売であるので貿易を主軸とし、成り立つものである。

第三图过丘圆顶、第五图过平顶、第七图过坡

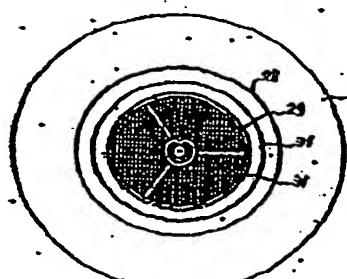
• 10 •

本用、壁に設けた窓より一端にかかる吸排扇回
・スッカニ内ヨリ一端向外かする吸排扇回。壁に設
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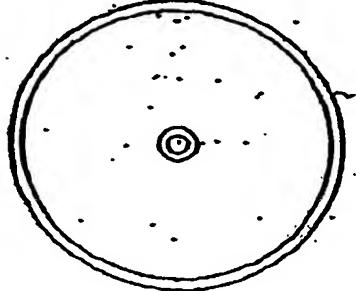
出願人 有田水社 藤和株式会社
代理人 三浦 勉

22

第2図

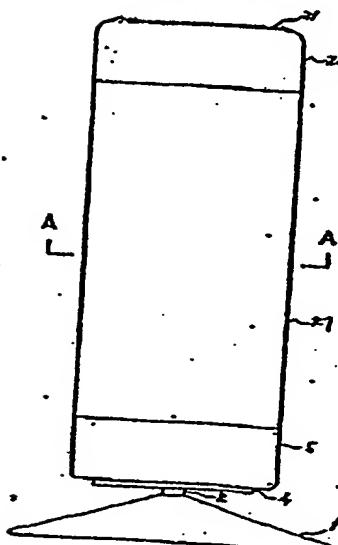


第3図

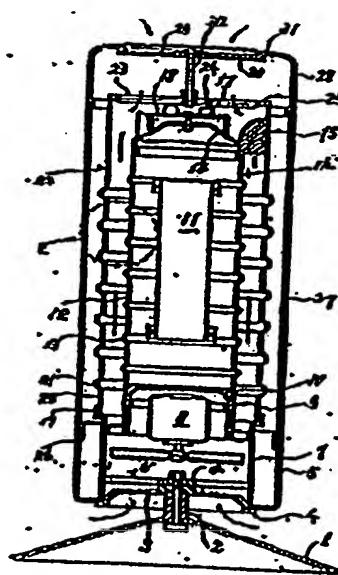


-100-

第1図



第4図

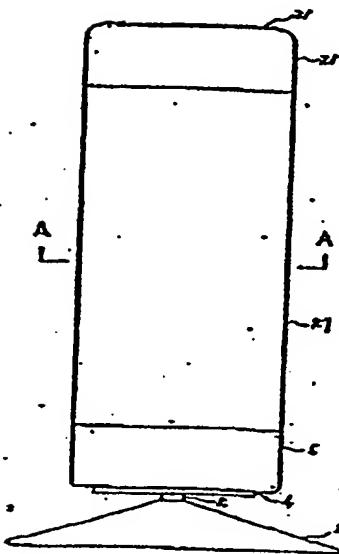


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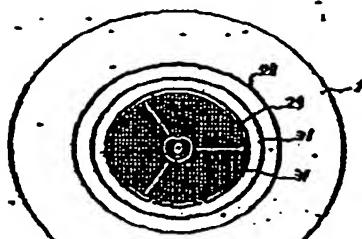
発明人　吉川幸雄　高知市工
代理人　三　省　在

特開昭51-90077 ④

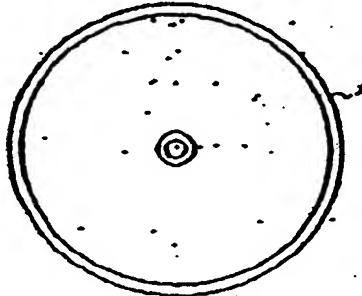
第一図



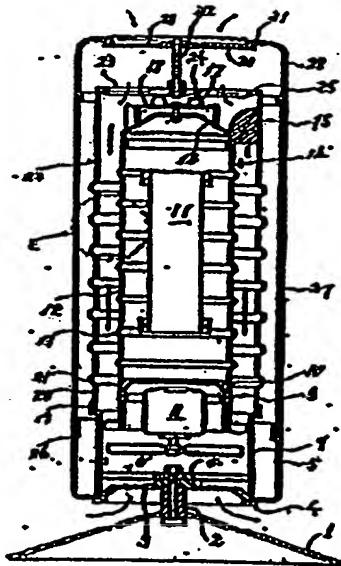
第2図



第3図



第4図

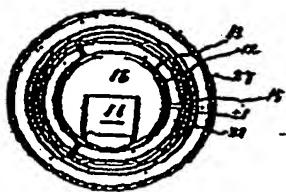


(5)

特開昭61-90077

特開昭61-90077 (5)

第5図



第6図 第7図 第8図

